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| 10/791,218 | 03/02/2004 | Rong Zheng | MFL-004 | 3942 |
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| GOODWIN PROCTER LLP PATENT ADMINISTRATOR 53 STATE STREET EXCHANGE PLACE BOSTON, MA 02109-2881 | | | | GUILL, RUSSELL L |
| ART UNIT | | PAPER NUMBER | | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/791,218 | ZHENG ET AL. | |
| | Examiner | Art Unit | |
| | Russ Guill | 2123 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 18 September 2008.

2a) This action is **FINAL**. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-17,22-49,53-56 and 68-74 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 45-49 and 71-73 is/are rejected.

7) Claim(s) 1-17,22-44,53-56,68-70 and 74 is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on 02 March 2004 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

| | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ . |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____. | 6) <input type="checkbox"/> Other: _____ . |

DETAILED ACTION

1. This Office Action is in response to an Amendment dated September 18, 2008, for application 10/791218, filed March 2, 2004. The application claims priority to provisional application 60451825, filed March 3, 2003. Claims 18 – 21, 50 – 52, 57 – 67 were canceled. Claims 72 – 74 were added. Claims 1 – 17, 22 - 44, 45 – 49, 53, 54 - 56, 68 – 70, 71, 72 – 74 have been examined. Claims 45 – 49, 71 - 73 have been rejected. Claims 1 – 17, 22 - 44, 53, 54 - 56, 68 – 70, 74 are objected to.

2. The Examiner would like to thank the Applicant for the well-prepared response, which was useful in the examination process. The Examiner appreciates the effort to carefully analyze the Office action, and make appropriate arguments and amendments.

Response to Arguments

3. Regarding claim 26 rejected under 35 U.S.C. § 112, second paragraph:
 - a. Applicant's arguments have been fully considered, and are persuasive.

4. Regarding independent claims 1, 53, 54 rejected under 35 U.S.C. § 103:
 - a. Applicant's arguments have been fully considered, and are persuasive.

5. Regarding independent claim 45 rejected under 35 U.S.C. § 103:
 - a. Applicant's arguments have been fully considered, but are not persuasive, as discussed below.
 - b. The Applicant argues:

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- c. Without acquiescing to the rejection, but in order to advance the claims to allowance, Applicants amend claim 45 to recite, in part:
 - i. predicting a value of a property of the material using the morphological characterization, wherein the value of a property of the material is used in the process description in step (b) to characterize flow;
 - ii. predicting a value of a property of a product using the morphological characterization, wherein the product is made from the processed material; and
 - iii. performing a structural analysis of the product using the predicted value of the property of the product.
- d. Neither **Zheng**, **Yu** nor **Kennedy**, either alone or in combination, teaches or suggests this limitation.
- e. Firstly, both **Zheng** and **Yu** fail to describe predicting a value of a property of a product. While both **Zheng** and **Yu** appear to describe characterizing the flow of a material, they both fail to describe predicting a property of a product made from that material.
 - i. The Examiner respectfully replies:
 - ii. As recited in the rejection of claim 45 below, **Zheng** appears to teach both “predicting a value of a property of a product” and “predicting a property of a product made from that material.” Thus, the argument is not persuasive.
- f. The Applicant argues:
- g. Secondly, both **Zheng** and **Yu** fail to describe or disclose a structural analysis of any kind. **Zheng** appears to describe simulating the formation of a product from a processed material but does not describe performing a structural analysis

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on that product. Similarly, Yu appears to describe a method of simulating fluid flow but it does not describe the formation of a product or a structural analysis of a product.

- i. The Examiner respectfully replies:
- ii. Zheng and Yu are not relied upon to teach performing a structural analysis of a product; rather Kennedy appears to teach the limitation, as recited in the rejection of claim 45 below. Further, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

- h. The Applicant argues:
- i. Thirdly, while **Kennedy** describes a structural analysis, Kennedy does not predict "a value of a property of a product using the morphological characterization." More specifically, **Kennedy** fails to describe a morphological characterization at least because it does not consider crystallinity in any way. Kennedy appears to describe suspended fibers, but suspended fibers are not the same as suspended crystals and are unrelated to polymer morphology. In other words, since characterizing fibers is different from characterizing morphology, **Kennedy** fails to disclose a morphological characterization. Lacking a morphological characterization, **Kennedy** is unable to describe predicting a property from a morphological characterization and subsequently using that property in a structural analysis.

- i. The Examiner respectfully replies:
- ii. First, Kennedy is not relied upon to predict "a value of a property of a product using the morphological characterization". One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).
- iii. Second, morphology includes more than crystallinity.
- iv. Third, Kennedy uses crystallinity in the calculation of flow, at least at page 162, section 2.1 Flow and flow-induced fibre orientation, see the paragraph below equation 3. Thus, Kennedy appears to predict a property from a morphological characterization, and use that property in a structural analysis (*section 3.4 Structural Analysis*).

- j. The Applicant argues:
 - k. By contrast, Applicant's method of "predicting a value of a property of a product using the morphological characterization, wherein the product is made from the processed material; and . . . performing a structural analysis of the product using the predicted value of the property of the product" provides considerable advantages over the prior art by, for example, providing more accurate predictions of both the formation of a product and the properties of the product. By accurately characterizing morphology both during and after product formation, Applicants method provides more accurate property predictions, thereby yielding more accurate structural analyses and, ultimately, more cost-effective products.

- i. The Examiner respectfully replies:

ii. Applicant's argument does not distinguish between the claim and the prior art.

I. The Applicant argues:

m. Therefore, since **Zheng, Yu and Kennedy** fail to describe each and every element of Applicants independent claim 45, as amended. Applicants respectfully submit that claim 45 is patentable over **Zheng, Yu** and Kennedy. Because claims 46-49 and 71 depend, either directly or indirectly, from independent claim 1, Applicant respectfully submits that these claims are patentable as well. Reconsideration and withdrawal of the rejection of claims 45-49 and 71 under 35 U.S.C. § 103(a) based on **Zheng, Yu** and Kennedy is respectfully requested.

i. The Examiner respectfully replies:

ii. As discussed above, the rejection of claim 45 is maintained, and thus the rejections of the dependent claims are also maintained.

Claim Objections

6. Claim 71 is objected to: the claim recites step (e) of the parent claim 45, but claim 45 was amended such that claim 71 appears to now need to recite step (f) of the parent claim.
7. Claims 1, 45, 54 are objected to: a valid process under 35 USC § 101 must either 1) transform underlying subject matter, or 2) be tied to another statutory class, such as a particular apparatus. In order to qualify as a statutory process, the claim should positively recite the other statutory class to which it is tied, for example by identifying the apparatus that accomplishes the method steps. The language of the claims appears to raise the question of a missing link to another statutory class.

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a. A recitation of a computer in the preamble does not appear to be sufficient to tie the process to a particular apparatus. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951). [I]t is assumed that the preamble language is duplicative of the language found in the body of the claims or merely provides context for the claims, absent any indication to the contrary in the claims, the specification or the prosecution history.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

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consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. **Claims 45 - 49 and 71 - 73** are rejected under 35 U.S.C. 103(a) as being unpatentable over Zheng (R. Zheng and P. Kennedy, "Numerical Simulation of Crystallization in Injection Molding", art provided by the Applicant on the Information Disclosure Statement dated January 31, 2005, item number C118) in view of Yu (U.S. Patent Number 6,096,088), further in view of Kennedy (R. Zheng, P. Kennedy, N. Phan-Thien, X-J. Fan; "Thermoviscoelastic simulation of thermally and pressure-induced stresses in injection moulding for the prediction of shrinkage and warpage for fibre-reinforced thermoplastics", 1999, Journal Non-Newtonian Fluid Mechanics, pages 159 - 190).

- a. The art of Yu is directed to design of articles to be manufactured by injection molding, preferably from molten plastic materials (*column 1, lines 5 - 10*).
- b. The art of Zheng is directed to numerical simulation of crystallization in injection molding of polymers (*title, abstract*).
- c. The art of Kennedy is directed to simulation of stresses in injection molded plastic products (*page 159, Abstract*).
- d. The art of Zheng and the art of Yu are analogous art at least because they both pertain to injection molding of plastic articles.
- e. The art of Zheng and the art of Kennedy are analogous art because they both pertain to the art of injection molded plastic articles.
- f. The motivation to use the art of Yu with the art of Zheng would have been the benefit recited in Yu that economic benefit is derived from simulation because problems can be predicted and solutions tested prior to the actual creation of a mold (*column 1, lines 25 - 30*).

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g. The motivation to use the art of Kennedy with the art of Zheng would have been the knowledge of the ordinary artisan that predicting shrinkage and warpage in finished products is a benefit (*page 159, Abstract, "The computed residual stresses enable us to predict shrinkage and warpage in the finished products"*). Further, Kennedy appears to be a co-author of the Zheng reference.

h. Regarding claim 45:

i. Zheng appears to teach:

j. (c) obtaining a morphological characterization of the material using the characterization of the flow of the material (*sixth page, section "Numerical Method", second paragraph, "The generalized Newtonian kinematics obtained from the solution of the Hele-Shaw equation are then used to calculate the viscoelastic stresses, orientation and crystallinity . . ."*);

k. (d) predicting a value of a property of the material using the morphological characterization, wherein the value of a property of the material is used in the process description in step (b) to characterize flow (*seventh page, section "Results and Discussion", first paragraph, "The predicted crystallinity can be further used in the viscosity calculation"; viscosity is a property of a material predicted using the morphological characteristic, crystallinity; first and second pages, section "Governing Equations", especially equations 4 - 6, viscosity is used to calculate flow by the Hele-Shaw equation; please note that Hele-Shaw equations are used in step (b) below by Yu*).

l. (e) predicting a value of a property of a product using the morphological characterization, wherein the product is made from the processed material (*pages eight and nine, section "Injection Molding Simulation", and figures 2, 3, 4; at the least, figure 3 shows stress in the product that includes results of morphological characterization; also see first page, section "Introduction", at least, "The microstructure, in turn, significantly influences the end-use*

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properties of injection molded products. It also results in difference in shrinkage behavior . . .");

m. Zheng does not specifically teach:

n. (a) providing a process description comprising at least one governing equation;

o. (b) obtaining a characterization of a flow of a material using the process description;

p. (f) performing a structural analysis of a product made from the material using the predicted value of the property of the product.

q. Yu appears to teach:

r. (a) providing a process description comprising at least one governing equation (*column 1, lines 47 - 60; and column 13, lines 12 - 45; this limitation appears to be common knowledge in the art; column 3, lines 33 - 40, analysis by Hele-Shaw equations*);

s. (b) obtaining a characterization of a flow of a material using the process description (*column 1, lines 47 - 60; and column 13, lines 12 - 45; this limitation appears to be common knowledge in the art*);

t. Kennedy appears to teach:

u. (f) performing a structural analysis of a product made from the material using the predicted value of the property of the product (*page 175, section 3.4 Structural analysis; and pages 181 - 183, section 4.3 and figure 10*).

v. Obviousness must be determined in light of the knowledge of the ordinary artisan. The following references teach knowledge of the ordinary artisan:

i. Z. Fan, R. Zheng, P. Kennedy, "Warpage Analysis of Solid Geometry", art provided by the Applicant on the Information Disclosure Statement dated August 13, 2004, item C35; teaches structural analysis and warpage analysis using finite element method.

ii. Antonios K. Doufas et al., "A continuum model for flow-induced crystallization of polymer melts", art provided by the Applicant on the Information Disclosure Statement dated August 13, 2004; teaches simulation of flow-induced crystallization of polymer melts (*Abstract*) using a two phase model with crystallization kinetics (*Abstract, and page 86, last paragraph*), and calculating material properties from morphology (*pages 94 – 95, section C. Calculation of material and rheo-optical properties*).

iii. X. Guo et al., "Crystallinity and Microstructure in Injection Moldings of Isotactic Polypropylenes. Part 1: A New Approach to Modeling and Model Parameters", art provided by the Applicant on the Information Disclosure Statement dated August 13, 2004, item C42; teaches a simulation of injection molding process of semi-crystalline polymers to predict the development of crystallinity and microstructure (*page 2113, section Conclusions*).

w. Therefore, as discussed above, it would have been obvious to the ordinary artisan at the time of invention to use the art of Yu and the art of Kennedy with the art of Zheng to produce the claimed invention.

x. Regarding **claim 46**:

y. Zheng does not specifically teach:

z. wherein step (e) comprises creating a structural analysis constitutive model.

aa. Kennedy appears to teach:

bb. creating a structural analysis constitutive model (*page 166, equation (10), Hooke's law is a structural analysis constitutive model*).

cc. Regarding claim 47:

dd.Zheng does not specifically teach:

ee. wherein step (e) comprises predicting a response of the part to a load.

ff. Kennedy appears to teach:

gg. wherein step (e) comprises predicting a response of the part to a load (*page 175, section 3.4 Structural analysis, second paragraph, first sentence, "the load term", and second sentence, "Once the load and boundary conditions are applied, . . .").*

hh.Regarding claim 48:

ii. Zheng does not specifically teach:

jj. wherein step (e) comprises predicting warpage of the part.

kk.Kennedy appears to teach:

ll. predicting warpage of the part (*page 181, section 4.3, first sentence*).

mm. Regarding claim 49:

nn.Zheng does not specifically teach:

oo. wherein step (e) comprises predicting at least one member of the group consisting of warpage, shrinkage, crack propagation, creep, wear, lifetime, and failure.

pp.Kennedy appears to teach:

qq.predicting warpage (*page 181, section 4.3, first sentence*).

rr. Regarding claim 71:

ss. Zheng does not specifically teach:

tt. wherein step (e) comprises predicting a response of the part to a thermal load.

uu. Kennedy appears to teach:

vv. wherein step (e) comprises predicting a response of the part to a thermal load (*page 175, section 3.4 Structural analysis, second paragraph, first sentence, "The calculated thermally . . . induced stresses serve as the initial stresses to form the load term . . ."*).

ww. Regarding claim 72:

xx. Zheng does not specifically teach:

yy. wherein the process description comprises a representation of an injection molding process.

zz. Yu appears to teach:

aaa. wherein the process description comprises a representation of an injection molding process (column 1, lines 47 - 60; and column 13, lines 12 - 45; this limitation appears to have been common knowledge in the art).

bbb. Regarding claim 73:

ccc. Zheng does not specifically teach:

ddd. wherein the process description comprises a representation of at least one member of the group consisting of an extrusion process, a

blow molding process, a vacuum forming process, a spinning process, and a curing process.

eee. Official Notice is taken that it was old and well known at the time of invention in the art of analyzing a plastic fluid flow to use an extrusion process. It would have been obvious to the ordinary artisan to use this knowledge to satisfy the limitation of a process description comprising a representation of an extrusion process. The motivation would have been the knowledge of the ordinary artisan that an extrusion process was useful to form plastic products. The references to support the Official Notice teach knowledge of the ordinary artisan:

- i. Nakano (U.S. Patent Number 6161057) teaches an extrusion process (*column 18, lines 30 - 45*).

11. Examiner's Note: Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the Applicant in preparing responses, to fully consider the references in their entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner. The entire reference is considered to provide disclosure relating to the claimed invention.

Allowable Subject Matter

12. Any indication of allowability of claims 1 - 17, 22 - 44, 53, 54 - 56, 68 - 70, 74 is withheld pending resolution of the outstanding objections.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

14. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

15. While not prior art, the following document appears to be relevant:

a. R. Zheng and P.K. Kennedy, "A model for post-flow induced crystallization: General equations and predictions", art provided by the Applicant on the Information Disclosure Statement dated November 16, 2004, item C105; appears to describe further rationale supporting the invention, *especially page 825, paragraph after equation 2, and page 826, paragraph after equation 8, and page 840, section IV. Conclusions.*

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Russ Guill whose telephone number is (571)272-7955. The examiner can normally be reached on Monday - Friday 9:30 AM - 6:00 PM.

17. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached on 571-272-375353. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Any inquiry of a general nature or relating to the status of this application should be directed to the TC2100 Group Receptionist: 571-272-2100.

18. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Russ Guill
Examiner
Art Unit 2123

RG

/Paul L Rodriguez/
Supervisory Patent Examiner,
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